

PATENT COOPERATION TREATY

ESI-116ATL

From the INTERNATIONAL BUREAU

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RECEIVED

APR 19 2004

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(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
11 April 2002 (11.04.2002)

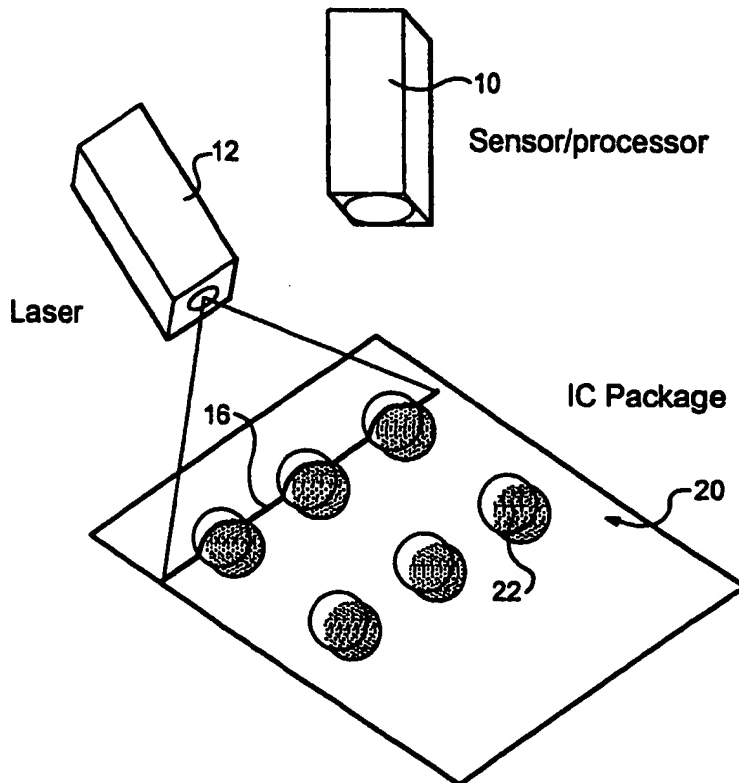
PCT

(10) International Publication Number
WO 2002/029357 A3

- (51) International Patent Classification⁷: **G06T 7/00** (US). EVANS, Frank; 226 S.W. Walnut Avenue, Dundee, OR 97115 (US).
- (21) International Application Number: PCT/US2001/041293 (74) Agent: BEJIN, Thomas, E.; Young & Basile, P.C., Suite 624, 3001 West Big Beaver Road, Troy, MI 48084 (US).
- (22) International Filing Date: 6 July 2001 (06.07.2001)
- (25) Filing Language: English (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (26) Publication Language: English (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
- (30) Priority Data:
09/680,342 5 October 2000 (05.10.2000) US
- (71) Applicant: ELECTRO SCIENTIFIC INDUSTRIES, INC. [US/US]; 13900 NW Science Park Drive, Portland, OR 97229-5497 (US).
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[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR EVALUATING INTEGRATED CIRCUIT PACKAGES HAVING THREE DIMENSIONAL FEATURES



(57) Abstract: The present invention provides for methods and apparatus for evaluating objects having three dimensional features. One method involve using both two dimensional data sets to improve the processing of three dimensional data sets. The two dimensional data set can be used to pre-qualify the three dimensional data set, or may be used to locate that data within the three dimensional data set which is characteristic of the three dimensional feature. The invention may include a sensor which is configured to capture both three dimensional and two dimensional data. The present invention provides for an efficient technique to evaluate three dimensional data. The present invention also solves heretofore unrecognized problems associated with geometric distortion.



Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(88) Date of publication of the international search report:

8 April 2004

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/41293

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06T7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	EP 0 471 196 A (SIEMENS AG) 19 February 1992 (1992-02-19) abstract page 2, line 24 - line 25 page 2, line 57 - page 3, line 5 page 3, line 44 - line 56 ----- -/--	1-3 4,6,7

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

8 August 2003

Date of mailing of the international search report

13.02.2004

Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/41293

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>MENGEL P: "Automated inspection of solder joints on PC boards by supplementary processing of 3D and gray-level images" SIGNAL PROCESSING AND SYSTEM CONTROL, FACTORY AUTOMATION. PACIFIC GROVE, NOV. 27 - 30, 1990, PROCEEDINGS OF THE ANNUAL CONFERENCE OF THE INDUSTRIAL ELECTRONICS SOCIETY. (IECON), NEW YORK, IEEE, US, vol. 1 CONF. 16, 27 November 1990 (1990-11-27), pages 786-791, XP010038268 ISBN: 0-87942-600-4 abstract</p> <p style="text-align: center;">-----</p>	1-4,6,7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/41293

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-4, 6-7

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4,6,7

3D feature location on a 3D data set using a corresponding 2D data set.

2. claims: 5, 14-16

Single sensor arrangement for acquiring 2D and 3D data.

3. claims: 8-13

Prescreening the quality of an IC package in 2D to avoid unnecessary 3D data processing

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/41293

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0471196 A	19-02-1992	EP JP	0471196 A2 4255077 A
			19-02-1992 10-09-1992